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ABSTRACT

This review of literature related to college-level manpower planning in Indiana is the initial report of the College-Level Manpower Study of the Indiana Commission for Higher Education. This review deals with manpower studies at the national level, with studies conducted in other states, and with studies that deal specifically with Indiana. This review is important because: it is the first compilation of available college-level manpower information which is related to state planning in Indiana; it should serve as an aid to others either conducting or considering studies related to college-level manpower; as the first step of our long-term study, it offers a framework within which to work; it has helped to identify areas of potential manpower supply and demand imbalances which may require more detailed study. An extensive bibliography is included. (Author/PG)

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REVIEW OF LITERATURE RELATED TO A COLLEGE-LEVEL MANPOWER STUDY FOR THE STATE OF INDIANA

ED 105 802

INDIANA COLLEGE-LEVEL MANPOWER STUDY

Report Number One

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INDIANA COLLEGE-LEVEL MANPOWER STUDY

Report Number One

REVIEW OF LITERATURE RELATED TO A COLLEGE-LEVEL MANPOWER STUDY FOR THE STATE OF INDIANA

by

Robert M. Greenberg, Ed.D.
Project Director

and

Richard B. Tully
Research Associate

January, 1975

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is supported by a grant from the
Lilly Endowment

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may be obtained for $1.50 from:

Indiana Commission for Higher Education
143 W. Market Street
Indianapolis, Indiana 46204

Richard D. Gibb, Commissioner
Carl F. Lutz, Deputy Commissioner

PREFACE

This review of literature related to college-level manpower planning in Indiana is the initial report of the College - Level Manpower Study of the Indiana Commission for Higher Education. The review deals with manpower studies conducted at the national level, with studies conducted in other states and with studies which deal specifically with Indiana.

This review should have value for a number of reasons.

1. It is the first compilation of available college-level manpower information which is related to state planning in Indiana.
2. It should serve as an aid to others either conducting or considering studies related to college-level manpower.
3. As the first step of our long-term study, it offers a framework within which to work.
4. It has helped to identify areas of potential manpower supply and demand imbalances which may require more detailed study.
5. It serves as the beginning of an ongoing effort to collect relevant manpower-related data.

The College-Level Manpower Study is supported by a grant from the Lilly Endowment to the Indiana Commission for Higher Education. The Indiana Commission for Higher Education wishes to express its appreciation to the Lilly Endowment and the many individuals and organizations who supplied information for this study.

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PART I
INTRODUCTION

In its most elementary sense, a manpower planning study is an attempt to determine the relationship between the supply and demand of labor and skills in a defined geographical territory and over a period of time. Most often, past and present relationships between manpower supply and demand are used to forecast a future situation.

There are two ways in which manpower forecasting could be a precise science. The first is in a controlled-society environment in which future manpower needs and demands are determined, and the entire society and its economy are then organized to meet those requirements. For example, it is declared that a given number of environmental engineers will be required by a specified time. Exactly that number are then produced by controlled methods. In such a system, little room can be allowed for individual preferences, as all aspects of supply and demand are managed by the state. Theoretically, this control is possible but in practice there are always some variables involving humans and the physical environment which are simply not subject to control.

The second manner in which manpower forecasting could be precise is by means of a system whereby all variables can be taken into account in predicting future developments. This would require the ability to predict natural events, human

desires, political and social developments, and technological advances. Efforts to predict the future with accuracy have had a consistent record of failures.

The ability to anticipate future developments has been enhanced by analytical methods adopted from the mathematical and physical sciences. Typically, future developments are arrived at by projecting past trends within a given set of future conditions. For example, we can take the GNP of the United States for the past decade and project its performance for the future decade, given a similar set of circumstances. However, we might modify our efforts by attempting to account for the effects of intervening variables such as the Vietnam War. We also recognize that a projection made before the imposition of the Arab oil embargo or the development of the current economic recession would differ greatly from projections made after the onset of these events. Projections must be acknowledged for what they are: extrapolations of the past in which specified variables may be taken into account by predetermined means. Projections should not be considered accurate predictions of the future because the variables affecting future conditions are subject to change.

Manpower forecasters have recognized their inability to predict the future accurately. However, they can project certain aspects of present situations into the future, given data of the past and adding specific assumptions regarding the future. Their projections are sometimes inaccurate because their assumptions are wrong or incomplete. Also, projections may turn out

to be inaccurate because the projection of manpower supply/demand imbalances may prompt corrective action which will invalidate the projection.

Manpower forecasting is not dangerous in itself, though it must be used with caution. If the assumptions made in manpower studies are clearly stated and if the findings are regularly revised to take into account contemporary trends or developments, manpower forecasting can be an effective tool in planning.

The intent of this review of related literature is to present a general overview of the area of manpower studies relating to postsecondary education at the national and state levels, and to focus particularly on manpower studies conducted within the State of Indiana. Although the field of manpower research is still in a youthful stage of development, there is no problem finding published materials on the subject. For example, a recent preliminary report of the U.S. Public Health Service titled Documents Related to Health Manpower Planning: A Bibliography listed 1,550 books, monographs, journal articles and other documents. The problem is not one of finding manpower reports, but one of discriminating between those which are of use in a particular study and those which are of limited or no value. Certain manpower studies and reports are of definite value to postsecondary education planning and we have limited the scope of this review to these works.

PART II

NATIONWIDE GENERAL MANPOWER STUDIES

Manpower studies and related data which pertain to the entire nation can be of immense value to planners at the state level. Nationwide studies can help identify problem areas requiring further investigation at the state level and often provide information which, when modified appropriately, can be used at the statewide level. National data can also be used to establish standards (e.g. physician/population ratios to be compared at state and national levels) whereby a state's effectiveness in meeting manpower demands or needs can be evaluated ("demand" is used when actual job openings are considered while "need" is used when manpower requirements for meeting defined goals are considered). These data are, in some instances, more available and complete than those existing at more local levels and should be relied upon when this is the case.

Because the primary concern of this study is manpower planning at the state level, only a limited number of recent or ongoing efforts to provide national manpower information will be discussed. This, however, is not to imply that the manpower characteristics of a state can be isolated from those of its surrounding states or of the nation as a whole.

U.S. BUREAU OF LABOR STATISTICS (BLS)

The most widely read manpower research in the United States is probably that which is conducted by the Bureau of

Labor Statistics of the Department of Labor. Their major effort is published biennially as the Occupational Outlook Handbook, an encyclopedic volume containing manpower supply and demand information for more than 850 occupations. The occupations listed in the Occupational Outlook Handbook are presented in terms of the projected growth of an occupation and its anticipated annual job openings. As a result, the reader can gain insight into the future prospects of employment in each of the listed occupations. The Handbook is considered to be a valuable reference source for students, counselors, teachers, and parents who are seeking occupational information.

The Occupational Outlook Quarterly supplements the Handbook with articles on current developments in certain occupational areas. The biennial Occupational Outlook for College Graduates is primarily composed of material reprinted from the Handbook, dealing with occupations for which a college degree is required or recommended.

The Department of Labor and the Bureau of Labor Statistics also publish occasional bulletins and sponsor research by individuals and organizations. One of the most applicable to higher education was a 1970 publication generated in response to a request by the House Subcommittee of Higher Education titled, College Educated Workers, 1968-80. An analysis of expected supply and demand for college graduates through the 1970's was presented. A review of the manpower situation for all college graduates, the outlook for selected individual occupational fields, the outlook for college educated women, and the effect of the expansion of junior colleges on the

supply of college trained manpower were each discussed in this report.

U.S. BUREAU OF THE CENSUS

The U.S. Department of Commerce's Bureau of the Census provides a wealth of manpower related data in their decennial Census of Population and Subject Reports. Increased computerization of census reporting over the past two decades has permitted the computation of numerous previously unavailable crosstabulations, many of which deal with occupations and levels of education.

Data obtained from the 1960 and 1970 Census of Population reports reflect the increased educational levels of the American work force. These increases, even at the college levels, appear to be spread across the spectrum of vocational categories, and are not restricted to the categories most often associated with college education.

A problem associated with the use of census data in college-level manpower studies is that the reported years of college attended do not specify degrees obtained. The highest category reported in the 1970 census is six or more years of college, which is too general for many manpower studies but which can be of value in ascertaining trends.

Table 1 represents data drawn from 1960 and 1970 Census of Population Subject Reports showing the rise in educational levels of the ten broad occupational categories of the male labor force of 25 years and older.

TABLE 1: PERCENT OF EMPLOYED MALES 25 YEARS OLD AND OVER, BY MAJOR OCCUPATION GROUP, BY YEARS OF SCHOOL COMPLETED, 1960 AND 1970.

Years of School Completed		MAJOR OCCUPATION GROUP										
		Professional Technical And Kindred	Managers and Administrators Except Farm	Sales Workers	Clerical And Kindred	Craftsmen Foremen & Kindred	Operatives Including Transport	Laborers Except Farm	Farmers And Farm Managers	Farm Laborers And Farm Foremen	Service Workers	Total All Occupations
High School Diploma Or Less	1960	24.5%	65.6%	66.9%	74.8%	91.8%	95.6%	97.1%	93.0%	97.4%	92.4%	79.9%
	1970	22.1	54.6	58.6	71.3	89.8	94.1	94.7	89.4	95.1	88.8	72.6
1 to 3 Years of College	1960	17.1	17.5	18.7	16.3	6.2	3.6	2.3	4.8	1.9	6.0	9.3
	1970	17.1	19.7	22.1	18.4	8.0	4.9	4.1	6.8	3.3	8.5	11.7
4 Years Of College	1960	23.6	12.0	11.3	6.3	1.5	0.5	0.4	1.7	0.6	1.1	5.8
	1970	23.2	15.6	14.6	7.0	1.6	0.7	0.8	3.0	1.2	1.7	7.8
5 or More Years of College	1960	34.9	5.0	3.1	2.7	0.5	0-2	0.2	0.4	0/2	0.5	5.0
	1970	37.6	10.1	4.7	3.3	0.6	0.3	0.4	0.8	0.4	1.0	7.9
Median Number of School Years Completed	1960	16.4	12.5	12.2	12.3	10.3	9.1	8.3	8.7	6.8	9.1	11.0
	1970	16.5	12.9	12.8	12.5	11.8	10.7	9.3	10.6	8.1	10.9	12.3

SOURCE: 1960 and 1970 Census of Population, Subject Reports PC(2)-5B, Educational Attainment.

U.S. OFFICE OF EDUCATION

The National Center for Educational Statistics of the Department of Health, Education, and Welfare, U.S. Office of Education has produced a great quantity of material related to college-level manpower planning. Each year the Center publishes large volumes of summary data including the Digest of Educational Statistics, an abstract of statistical information covering United States education from kindergarten through graduate school. Information on enrollments, teachers, graduates, educational attainment, finances, federal funds for education, libraries, and research and development is presented.

Another annual publication of the Center, Projections of Educational Statistics, provides projections of statistics for elementary and secondary schools and institutions of higher education over a ten-year period. Projections are made for enrollments, graduates, teachers, and expenditures based on Office of Education data collected over the previous ten-year period. A basic assumption for the projections is that the trends established in enrollment rates, retention rates, class size, and per student expenditures over the previous ten years will continue through the following ten years.

Data and projections from the National Center for Educational Statistics, as reported in Projections of Educational Statistics 1982-83, documented the current levelling off of degrees being granted by colleges and universities. A summary of this report is contained in Table 2. Similar pro-

jections are also prepared for degrees granted by fields of study, sex, and type of institution.

TABLE 2: DEGREES AWARDED: 1962-63 to 1982-83
(Figures in thousands)

	1962-3	64-5	66-7	68-9	70-1	72-3	74-5	76-7	78-9	80-1	82-3
Bachelor's	416	501	558	728	840	941	950	958	990	1,005	999
First Professional	27	29	32	36	38	50	54	58	61	63	65
Master's	95	117	158	194	231	251	274	293	313	329	338
Doctor's	13	16	21	26	32	34	41	47	48	50	52

Figures for 1972-3 are estimates
Figures for 1974-1982 are projected

Source: Projections of Educational Statistics to 1982-83

The Center also reports, annually, information obtained from Higher Education General Information Survey forms. Fall Enrollment in Higher Education is reported by sex of student, control and level of institution, state or other area, and individual institution. Similar information for awards less than the bachelor's degree is published in Associate Degrees and Other Formal Awards Below the Baccalaureate.

The data provided by the Center for Educational Statistics are valuable not only in and of themselves, but also because they have diminished much of the confusion in determining degree levels and categories. Their efforts to promote statistical

consistency in reporting information have led to a significant increase in the value of data because of the greater comparability of data obtained from the different states. The data generated by the Center for Educational Statistics are a vital element in the estimation of future college-level manpower supply.

NATIONAL PLANNING ASSOCIATION

Manpower Requirements for National Objectives in the 1970's was a report prepared for the U.S. Department of Labor by the National Planning Association (NPA), a nonprofit private organization. Whereas most manpower studies have dealt with demand projections for manpower, the NPA considered the manpower required to meet previously determined national goals in sixteen predetermined areas. These sixteen areas were:

1. Agriculture
2. Area Redevelopment
3. Consumer Expenditures
4. Education
5. Health
6. Housing
7. International Aid
8. Manpower Retraining
9. National Defense
10. National Resources
11. Private Plant & Equipment
12. Research and Development
13. Social Welfare
14. Space
15. Transportation
16. Urban Development

The NPA reported that in order to meet national goals in all of these areas by 1975 the civilian labor force would have to rise to approximately 100 million, or about ten million more than was otherwise projected for that time. If these goals became national priority issues, the country would, therefore, be facing manpower shortage in many areas. The meeting of national goals in the sixteen areas would not only require a rapid growth in the size of the labor force, but also a sig-

nificant elevation in its level of educational attainment. The NPA study is the major example of a manpower study based upon manpower needs (to achieve social and economic goals) rather than upon manpower demands (analysis of job openings expected).

THE ENDICOTT REPORT

The Endicott Report is an annual survey of a sample of major business and industrial concerns conducted by Frank S. Endicott of Northwestern University. Endicott's report for 1975 (conducted in late 1974) is the 29th in this series which investigates trends in the employment of college and university graduates in business and industry. The 1975 report represented the responses of 160 companies encompassing all major regions of the nation.

Endicott reported the demand for graduates of different degree programs at the bachelor's and master's levels, and compared them with the previous year's demand. He also reported upon the salaries paid for new personnel by degree field and level. Turnover rates for personnel and factors influencing companies' changing needs were also included in The Endicott Report.

In his 1975 survey, Endicott found a wide variety in the respondents' employment plans. Overall, demand for graduates with the bachelor's degree was up one percent for 1975 while demand for new holders of master's was down four percent. However, these rates differed significantly with the graduate's major field of study. Table 3 represents the respondents' demand for new male graduates in 1974 and 1975.

TABLE 3: THE EMPLOYMENT OF INEXPERIENCED COLLEGE MEN DURING THE PAST YEAR AND FOR NEXT YEAR AS REPORTED BY 140 COMPANIES.

Bachelor's Level	Past Year (1974) No. Companies	Past Year (1974) No. Men	Next Year (1975) No. Companies	Next Year (1975) No. Men
Engineering	83	3658	84	3777
Accounting	80	2582	83	2843
Sales-Marketing	55	1391	59	1483
Business Administration	69	1644	72	1454
Liberal Arts	47	726	39	654
Production Management	20	88	24	100
Chemistry	24	87	22	111
Math-Statistics	48	372	43	300
Economics-Finance	36	209	35	165
Other Fields	36	343	33	299
TOTAL-Bachelor's Level		11,000		11,186
Master's Level				
Engineering	32	475	28	423
Other Technical Fields	22	145	19	114
MBA with Technical BS	22	144	23	155
MBA with Non-tech BA	50	437	45	400
Accounting	14	773	15	817
Other Non-tech fields	18	143	12	131
TOTAL-Master's Level		2,117		2,040

Source: The Endicott Report: 1975

Endicott found an increase in the companies' demand for college women. The 126 companies which hired a total of 1,990 college women from 1974 classes sought 2,139 graduates of 1975, an increase of seven percent.

COMMISSION ON HUMAN RESOURCES AND ADVANCED EDUCATION

One of the most comprehensive statements on college educated manpower supply and demand is the staff report of the Commission on Human Resources and Advanced Education titled Human Resources and Higher Education. Whereas most earlier studies had concentrated on a particular group, the Commission was concerned with the entire field of higher education and the manpower utilization of its graduates.

The authors analyzed trends in supply and demand for college graduates in both general and specific areas: arts and sciences, law, medicine, engineering, elementary and secondary school teaching, social work, nursing, and the performing arts. As in traditional studies, projections of new supply and demand or need at some future time were made. However, unlike most traditional studies, there was also an analysis of adjustments that may be made to reestablish the balance between supply and demand. The report also pointed out that, in the United States, there has existed a flexible arrangement between supply and demand where an undersupply situation seldom results in large numbers of vacancies. The system simply employs lesser trained workers or workers trained in a similar field. In a field in which there is a surplus of trained people, the market situation tends to use them to displace lesser trained people at lower

levels of employment within the field. Manpower research attempts to identify these imbalances and manpower planning attempts to lessen the imbalances and therefore the economic cost of the imbalances.

One of the aims of the Commission's report was to acquire knowledge about the higher education system and its interrelationships with the supply-demand system as a whole, thereby enabling planners to make better decisions. At this time, not enough information or understanding has been acquired. In the author's words:

> There does not yet exist an adequate theoretical apparatus for predicting the results of actions in the manpower field. But there is beginning to be enough understanding of educational trends, market adjustment mechanisms, and the dynamics of human behavior to give hope that we can progress beyond pure empiricism. The development of a more adequate theoretical basis for a policy will require the collaborative efforts of economists, psychologists, sociologists, and workers from still other disciplines.[1]

CARNEGIE COMMISSION ON HIGHER EDUCATION

The work of the Carnegie Commission on Higher Education represents the most extensive effort of American higher education to look closely at itself in an attempt to prepare better for the future. The Commission's researchers attempted to identify, describe, and analyze variables which would have important effects upon higher education, some of which dealt directly or indirectly with issues relating to manpower analysis.

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[1] Folger, John K.; Astin, Helen; and Bayer, Alan E., Human Resources and Higher Education, p. xxxii.

Among these issues were changing needs in professional education, the relationships between higher education and the labor market, the changing roles of women, the meaning of a college degree, and projections of supply and demand for manpower in certain vocations.

In A Degree and What Else?, Strumple pointed out that though the amount of extra lifetime earnings which could be attributed to college attendance was dependent upon the variables considered, there was a clear income increment with every stage of education. College graduates particularly enjoyed situational benefits such as less unemployment, less physical work, greater fringe benefits, and more vacation time. They also tended to enjoy their jobs more than those who had not attended college and they were more optimistic about their futures.

In the same publication, Coble discussed a number of social and historic factors influencing decisions on college attendance. Among those mentioned were a father's occupational status, the size of his family and the age differentials between children, perceived parental encouragement, the father's highest level of education, the high school climate, and the plans of the person's peers. Coble did not mention vocational aspirations as a reason for attending college but would possibly contend that such aspirations were developed concomitantly with college attendance plans and would be influenced by similar variables.

Once the decision to attend or not to attend has been made, the student engages in a process of choosing a field of study, often viewed ultimately as choosing a career. In Higher

Education and the Labor Market, Adkins described two different models explaining factors influencing the number of degree holders in a field.

In the technogenic model, changes in the numbers of degree holders for various fields are influenced by market conditions. Growth and technical innovations result in demand for a specialty exceeding supply, whereupon wages in that field rise. Students, reacting to the rise in wages, move into that field until, eventually, the supply will exceed the demand, wages will stabilize or fall, and students will move from the field. Though the demand side is basically rational, problems are generally found on the supply side, and a state of equilibrium between supply of and demand for manpower is uncommon.

The sociogenic model negates the traditional economic considerations found in the technogenic model. Social and historic forces (such as those described by Coble) determine enrollment rates, which are not particularly wage-sensitive. This model contends that demand for college educated manpower is contingent upon supply because employers are willing to hire virtually all graduates the system produces. Changing degree requirements and credentialism result, with some time lag, in adjustments on the vocational expectations and aspirations of future degree holders.

Adkins was inclined to attribute more interpretive value to the sociogenic model than to the technogenic, though he acknowledged varying degrees of validity in both. Most manpower research is based upon the technogenic model, which is

easier to deal with quantitatively than is the sociogenic.

In the same volume, Rawlins and Ulman offered evidence in support of the sociogenic model. As the supply of educated people rose, they claimed, educational requirements for jobs also appeared to rise. However, they offered evidence that wages did not necessarily rise accordingly.

In a report on a previous study relating jobs to educational backgrounds, Rawlins and Ulman claimed direct relationships were often minimal and that on-the-job training was frequently more important than educational training. "Underemployment" of college graduates in companies was often the initial stage of a screening process to determine those most suitable for advancement.

In College Graduates and Jobs the Carnegie Commission view toward manpower planning was expressed:

> We are totally opposed, with a few special exceptions, to a "manpower planning" approach to higher education; we believe that reliance on student choice is superior -- it is more flexible, a more constantly dynamic mechanism. Manpower planning leads toward rigidities and toward controls, and we find it, by and large, both an ineffective and repugnant mechanism and probably also an unenforceable one as well.[2]

This statement, though harshly critical of what the authors term "manpower planning," is not meant to condemn concern for estimates of future manpower supply and demand. The Commission recommended strongly that individual institutions of higher ed-

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[2]The Carnegie Commission on Higher Education, College Graduates and Jobs, p. 11.

ucation and state planning agencies place high priority on changing student choices of fields of study resulting both from fluctuations in the job market and in students' own interests and concerns.

The Commission then went on to report upon the outlook for the 1970's in the job market for college graduates in general, as well as for a number of specific professions including teachers, health professions, law, business administration, engineering, and science. In spite of their repugnance for "manpower planning" per se, the Commission recognized the need for greater research in the area of manpower supply and demand as it relates to higher education.

PART III.
NATIONWIDE STUDIES OF SPECIFIC PROFESSIONS

Numerous manpower studies have been conducted which relate to specific occupations and higher education degree productivity on a national level. These studies are carried out by a variety of agencies including government agencies, professional or occupational societies and organizations, and institutions of higher education. The following is a brief analysis of research related to a selection of these college-level manpower studies. In some cases they indicate findings of either a rapidly changing or conflicting nature, emphasizing the need for ongoing assessments of the manpower situation as opposed to a reliance upon outdated studies.

COLLEGE TEACHING AND PH.D.'S

During the 1960's, when enrollments in higher education were increasing rapidly, the demand for Ph.D.'s for teaching in most fields was in excess of the supply. The view held by many was that the quality of higher education in the nation would suffer because of the need to hire inadequately prepared college-level teachers. Now, with the end of the effects of the postwar baby boom, we face a reverse of that situation. In many fields from which large majorities of doctorate holders go on to seek jobs as teachers in colleges and universities there are large surpluses of doctorates for the teaching positions available.

Cartter, in Higher Education and the Labor Market, has developed projections of faculty requirements to 1990, based upon enrollment projections.

TABLE 4: PROJECTIONS OF FACULTY REQUIREMENTS TO 1990
(In thousands)

	Total Full-time Faculty	Faculty Required			Required with Doctorate		
		Replacement	Expansion	Total	Constant Quality(1)	Quality Improvement(2)	Maximum Absorption(3)
1970	344	6.9	16.2	23.1	10.2	11.9	17.3
1972	383	7.7	19.3	27.0	11.9	13.8	20.2
1974	419	8.4	17.8	26.2	11.6	13.7	19.7
1976	457	9.1	19.2	28.3	12.4	14.7	21.2
1978	490	9.8	15.5	25.3	11.2	13.6	19.2
1980	513	10.3	10.4	20.7	9.1	11.9	15.5
1982	525	10.5	3.7	14.2	6.2	8.8	10.6
1984	512	10.2	-10.4	-0.2	-0.1	2.5	-0.2
1986	480	9.6	-16.8	-7.2	-3.2	-0.8	-5.4
1988	460	9.2	-6.3	2.9	1.3	2.2	3.6
1990	459	9.2	-0.6	8.6	3.8	6.5	6.2

(1) Constant quality is defined as the number of new college teachers with doctorates required each year for the percentage of faculty with doctorates to remain at approximately 44 percent.

2) Quality improvement is defined as the number of new college teachers with doctorates required each year for the total percentage of faculty with doctorates to increase by 0.5 percent annually.

(3) Maximum absorption is defined as 75 percent of all new college teachers possessing the doctorate.

Source: Allan M. Cartter, "The Academic Labor Market," in Higher Education and the Labor Market.

Even where he takes quality improvement and maximum absorption into account, Cartter draws a pessimistic picture. Considering the probability of continued budgetary constraints in higher education, it is probable that the constant quality projection will prove to be the most accurate. This being the case, new holders of doctoral degrees will find competition for faculty positions extremely fierce, and many graduates of doctorate programs which traditionally produce college teachers may be forced to accept positions of underemployment.

There is evidence that students have begun responding to this market situation. They have appeared to shift from disciplines leading to college teaching careers and have moved into more applied areas. This shift was noticeable in data from 1970-71, as reported in Doctorate Manpower Forecasts and Policy, a publication of the National Board on Graduate Education.

TABLE 5: CHANGE IN FIRST-YEAR GRADUATE AND FIRST PROFESSIONAL DEGREE ENROLLMENTS

Discipline	Percent Change 1970-71
English and Literature	-2
Philosophy	-8
Foreign Languages	-7
Physics	-17
Chemistry	-7
Mathematics and Statistics	-12
Economics	-16
History	-10
Electrical Engineering	-12
Architecture and City Planning	+21
Applied Social Sciences	+14
Health Professions	+21
Business and Commerce	+7
Medicine	+14
Law	+11
Dentistry	+10

Source: Doctorate Manpower Forecasts and Policy.

ELEMENTARY AND SECONDARY SCHOOL TEACHER MANPOWER STUDIES

The postwar baby boom of the late 1940's led to a phenomenal growth of school age children from the early 1950's until the middle 1960's. This long-term increase in the numbers of enrollees in elementary and secondary schools, in turn, resulted in the development and recognition of an acute teacher shortage in the United States. The shortage received particular emphasis in the post-Sputnik era when the quality as well as the quantity of teachers in the nation was questioned, and increasing funds were generated at local, state, and federal levels of government to support the training and hiring of more and better teachers.

The demand for elementary school teachers attained its highest level in 1966 at 88,300 and that for secondary level teachers peaked at 1969 at 94,200.[3] Decreasing population growth rates subsequent to the baby boom then took effect and the demand for teachers experienced a sharp decline. However, the number of persons completing at least bachelor's level programs and meeting initial certification requirements did not experience a decline until 1973.[4] As a result, recent years in the United States have witnessed the development of a surplus of individuals trained as teachers.

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[3] NEA Research Bulletin, Oct., 1971.

[4] Teacher Supply and Demand in Public Schools, 1973, p. 27.

The severity of the current surplus of teachers is made apparent in the NEA's publication Teacher Supply and Demand in Public Schools, 1973.

TABLE 6: COMPARISON OF THE TOTAL NUMBER OF TEACHER EDUCATION GRADUATES WITH THE NUMBER OF NEW TEACHERS EMPLOYED IN 16 STATES, 1972-73

Subject	Total number of teacher education graduates	Number of new teachers employed	Difference	Number of teacher education graduates as percent of new teachers employed
ELEM (tot)	35,553	29,386	6,167	121.0
Reg. Instr.	31,794	24,598	7,196	129.3
Selected:				
Art	621	608	13	102.1
For. Lang.	68	42	26	161.9
Music	329	912	-583	36.1
Phys. & Health Ed.	425	885	-460	48.0
Special Ed.	2,316	2,341	-25	98.9
SEC. (tot)	52,662	25,078	27,584	210.0
Agric.	556	367	189	151.5
Art	2,201	870	1,331	253.0
Bus. Ed.	3,206	1,210	1,996	265.0
Dist. Ed.	316	338	-22	93.5
Eng.Lang.Arts	8,887	4,615	4,272	192.6
For. Lang.	2,283	846	1,437	269.6
Home Ec.	2,680	1,209	1,471	221.7
Ind. Arts	1,589	964	625	164.8
Math.	3,153	2,747	406	114.8
Music	2,616	1,046	1,570	250.1
Phys.Ed.				
Men	4,450	911	3,539	488.5
Women	2,837	1,043	1,794	272.0
Nat.& Phy.Sci.	3,204	2,402	802	133.4
Soc. Sci.	10,441	2,727	7,714	382.9
Trade,Ind., Voc.,Tech.	308	11,279	-971	24.1
Spec. Ed.	2,316	1,772	544	130.7
Other	1,619	732	887	221.2
UNGRADED(tot)	2,287	1,705	582	134.1
Librarian	489	1,035	-546	47.2
Guid. Couns.	1,798	670	1,128	268.4

Source: Teacher Supply and Demand in Public Schools, 1973.

As can be seen from the data of Table 6, demand was found to exceed supply in only six areas (elementary: music, physical and health education, special education; secondary: distributive education, trade-industrial-vocational-technical; and ungraded: librarian). Teacher surpluses were extremely severe in some areas of secondary level education in which teacher education graduates exceeded new teachers employed by more than two to one.

The NEA report used two measures of demand. Their adjusted trend criterion considered trends in staffing practices in recent years to determine demand. The quality criterion estimate took into account five qualitative types of change which could occur in public schools. These were:

1. Major modification in the school program and assignment load of teachers.
2. Enrollment growth related to enlarged educational programs.
3. Reduction in the ratio of pupils per teacher to provide special programs being encouraged through federal and state legislation.
4. Change in the rate by which persons having substandard qualifications are being replaced.
5. Elimination of large classes.[5]

These two methods of viewing demand yielded startlingly different results, particularly as they related to the supply of teachers. These differences are reported in Table 7.

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[5] Ibid, p. 23.

TABLE 7: SUPPLY/DEMAND FOR NEW TEACHERS IN FALL 1973

	Elementary	Secondary	Total
Adjusted Trend Criterion Demand Estimate	80,150	98,100	178,250
Quality Criterion Demand Estimate	478,050	409,250	887,300
Supply (estimate)	161,000	156,200	317,200

Source: Teacher Supply and Demand in Public Schools, 1973.

In a report to the Congress prepared by the U.S. Comptroller General, teacher supply was limited to graduates of education programs who desired teaching positions. Its supply estimates were, therefore, considerably lower than those of the NEA.

Questionnaire surveys of 276 colleges and universities, 495 school districts, and the 50 state departments of education were conducted in an attempt to gain quantifiable data. College officials indicated that about 27,000 teacher graduates at the elementary and secondary levels were unable to find teaching jobs. This was 16 percent of the total of teacher graduates. School districts reported that they hired the lowest percentages of applicants in men's physical education, social sciences, English, foreign languages, and distributive education. The highest percentages of applicants hired were in industrial arts, mathematics, trade and vocational, and special education.

The school districts indicated that in the absence of budget constraints, they would have hired approximately 28,000 additional teachers in 1971-72. These potential positions were more than equal to the oversupply of teachers for that year. Additional money would not have resolved the problem, however, because the surplus of teachers was not necessarily trained in the same areas for which additional desires existed.

The Comptroller General's report took the view that student achievement would not be measurably improved by additional teachers until a pupil-teacher ratio of 15-1 was attained. Costs for teachers' salaries would increase by billions were such a ratio to be reached, so the report viewed such estimates as the quality criterion estimate of the NEA as unrealistic. Instead, they claimed that a national strategy should be developed wherein surpluses in some areas could be reduced and at the same time potential teachers could be channeled into fields experiencing a demand exceeding supply.

Evidence exists that college students are finally responding to the teacher oversupply. From 1968 to 1972, teacher education graduates constituted approximately 35 percent of total college graduates. By 1973 this percentage was projected to fall to 32.6 percent and to drop even lower to 19.9 percent by 1976.[6] Thus there appears to be a belated reaction of students to the current teacher manpower situation.

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6 NEA Research Memo, June, 1973.

PHYSICIAN MANPOWER STUDIES

Many studies concerning supply and demand projections for physicians in the United States have been conducted in recent years. Though a number of variables limit the comparability of the studies (variables such as the methods of considering doctors of osteopathy, foreign medical school graduates, and physicians in government employ), the general finding has been that there is a serious shortage of physician manpower in this country.

It is common to calculate need for physicians on a per capita basis with need estimates usually falling between 164 and 180 per 100,000 population. However, the validity of such projected needs are hard to determine until we become better aware of the effects of cooperative health plans, health delivery teams, and federal support for health care upon the need for physicians. There is also a frequently mentioned maldistribution of doctors which greatly affects an optimum per capita ratio. It is difficult to attract doctors to rural areas or urban ghetto areas where their services may be in the greatest demand but least often found.

In Trends and Projections of Physicians in the United States 1967-2002, Blumberg documented a recent increase in physicians per capita in the United States. In 1949 there had been 128 active M.D.'s per 100,000 U.S. resident population. By 1963 this figure had risen only to 136.3, but by 1967 it was 143.1 and in 1970 had climbed to 150.2. About half of this rise in physicians per capita, Blumberg claims, is the result of an increase in entrants to medical schools begin-

ning in 1960. The other half is accounted for by the immigration of foreign medical graduates.

Blumberg offered a number of projections of U.S. medical school graduates, based upon varying entrance rates and accelerated versus nonaccelerated programs. Given an increase to 15,000 medical school entrants per year (1969 = 10,401 entrants) in conventional programs, by 1982 14,250 physicians would be added to the physician supply each year. This would give the nation 168.8 per 10,000 in 1982, a figure which would rise to 185.8 by 2002.

Blumberg's projection involves the assumption that, with increased physician production in the U.S., no foreign medical school graduates will enter the physician force after 1977. There are those who take issue with this assumption, among them the American Medical Association. In a 1971 report on physician manpower, the AMA expressed anticipation of increasing numbers of foreign medical school graduates establishing practices in this country, rising from the current 4,000 per year to an estimated 5,000 or 6,000 per year.

The AMA report cited a 1970 net increase of 9,000 M.D.'s in the United States. Maintenance of that growth rate, it claimed, combined with a national population growth rate of one percent, would result in a physician/population ratio of 180 per 100,000 by the end of 1975.

In November, 1973, the Assistant HEW Secretary for Health, Charles C. Edwards, reported a possible surplus of physicians at a meeting of the Association of American Medical Colleges. He reported that maintenance of the current output capacity of

medical schools could result in a 50 percent increase in the 1985 number of physicians over the 1970 number. This would represent approximately 220 physicians per 100,000 population. Edwards called for a reassessment of priorities in the health manpower field and questioned whether further increase in the capacity to train physicians was in the national interest.[7]

ENGINEERING MANPOWER STUDIES

Engineering is an extremely diverse field with more than 25 specialties and over 85 subdivisions. In addition, there are persons calling themselves engineers with everything from high school to doctoral levels of education. Generally, a minimum requirement for an entering "professional" in engineering is now considered to be a bachelor's degree in the field.

Jobs in engineering are greatly contingent upon two major sources of funds: research and development funds and federal government defense spending. As a result, there are sometimes fluctuations in the demand for engineers creating imbalances of supply and demand. A recent case was the federal cutback in aerospace programs, which led to widespread reports of poor job market for engineers and to a resultant drop in engineering program enrollments.

The situation now appears to be one in which there is a demand for more engineers than are being produced. The results of the 1974 employment survey of the Engineers Joint Council Manpower Commission (reported in New Engineer, Nov. 1974)

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[7] Higher Education and National Affairs, American Council of Higher Education, Vol. XXII, Number 41.

indicated that engineering graduates at all levels had been successful in obtaining employment. Sixty-seven percent of bachelor's degree recipients had accepted full-time employment, an increase of five percent over 1973, and an additional 17 percent were entering graduate studies. Six percent had no job offers or plans to report, as compared with eleven percent in 1972 and nine percent in 1971 who belonged in that category. 1975 was expected to be another good placement year for engineering graduates, who would number seven percent fewer than in 1974.

Engineering and Technology Graduates, 1973 was another report of the Engineering Manpower Commission. This report contained the findings of a survey of placement officers from 267 schools concerning the demand for engineering graduates relative to those of other curricula. Table 8 represents the findings of that survey.

TABLE 8: DEMAND FOR ENGINEERING GRADUATES COMPARED TO OTHER CURRICULA

	Relative Demand for Engineering Graduates(1)				
Other Curricula	Much Stronger	Somewhat Stronger	About Same	Somewhat Weaker	Much Weaker
Accounting	7%	21%	63%	6%	3%
Business & Mgmt.	24	52	22	1	1
Education	77	16	4	3	0
Lib. Arts & Human.	85	9	5	1	0
Life Sciences	50	36	12	2	0
Physical Sciences	39	52	9	0	0
Social Sciences	81	12	6	1	0

(1) Figures represent the percentage of 267 placement officers estimating the demand for engineering graduates relative to the demand for graduates of each of seven other curricula.

Source: Engineering and Technology Graduates, 1973.

As is apparent from the data of Table 8, the responding placement officers had perceived a greater demand for engineering graduates than for the graduates of other curricula. In no case did as many as ten percent of the respondents reply that the demand for engineering graduates was weaker than that for graduates of another field. In fact, except for accounting, more than 75 percent of the respondents claimed the demand for engineering graduates to be stronger than that in the other curricula. More than three-quarters felt that the demand for engineers was "much stronger" than that for graduates of liberal arts and humanities, social science, and education programs.

LAWYER MANPOWER STUDIES

In 1972 an American Bar Association Task Force on Professional Utilization undertook a study of the demand for lawyers in relation to the growing numbers of lawyers in the United States. They concluded that there was not, nor was there likely to be, a surplus of lawyers. The Task Force opposed an arbitrary restriction of places in law schools or an unnecessary raising of bar admission standards and supported the expansion of law school places as long as the demand for legal education continued at high levels. The findings of the Task Force were presented in Report of the Task Force on Professional Utilization.

The Task Force viewed the supply of lawyers by investigating the volume of Law School Admission Test (LSAT) applicants and the numbers of bar admissions. The number of

students attempting to enter law schools, as measured by LSAT volume, has increased extremely rapidly in the past decade. In 1960-61, there were 23,099 applicants to take the LSAT. By 1965-66 this figure rose to 44,906, and by 1970-71 it had climbed to 106,556.

In comparison with these increases in the numbers of aspirants to the legal profession, new admissions to the bar had increased relatively slowly. In 1949, there were 13,344 new admissions to the bar. In 1959 this figure had fallen to 10,744 and by 1969 had risen to 19,123. Still, there has been a significant increase in the number of lawyers per 1,000 population since 1951.

The future supply of lawyers is dependent upon the capability of law schools to expand, and on the development of new law schools. It appeared obvious from the numbers of students taking the LSAT that most law schools would have few problems in filling available places in the foreseeable future, and that many qualified applicants were rejected because of a paucity of openings. The Task Force concluded that supply will remain dependent upon the demand for lawyers because, if demand grows, law schools can be expected to expand.

The future demand for lawyers was also difficult to estimate. Social, economic, and political factors all play major roles in determining demand, and the growth in the number of legal paraprofessionals further confuses this issue. Though they were unable to develop projections of demand for legal services, the Task Force agreed unanimously that there would be a net increase in the demand for legal education in the United States.

Though this conclusion may be correct in a long-term sense, the current manpower situation for lawyers appears to be one in which supply considerably exceeds demand. A December, 1974 Newsweek article titled "A Surfeit of Lawyers" noted Bureau of Labor Statistics estimates of approximately 19,000 legal positions opening annually through 1985 while the 1974 freshman class numbers 38,000 individuals. The article documented a situation in which recent law school graduates have been unable to find related employment, and a Los Angeles firm reported an excess of 2,000 applications for its few available legal jobs.

PART IV.
STATEWIDE COLLEGE-LEVEL MANPOWER STUDIES
(NON-INDIANA)

Many statewide governing and coordinating agencies for postsecondary education have been concerned with studying manpower-related issues, but their efforts have not been widely publicized. In an effort to determine the involvement of these agencies in manpower planning, we contacted each agency and requested their studies which relate to college-level manpower planning.

We received responses from 40 of the 50 surveyed state agencies (includes District of Columbia) concerning their efforts in the area of manpower studies. Many states are active in studying information systems, program inventories, and enrollment projections, all of which deal with the supply side of a manpower study. Fewer appeared to be investigating manpower demand, and fewer still had developed methods whereby future supply and demand for college level manpower could be estimated. The Southern Regional Education Board (SREB) has been very active in sponsoring manpower studies in a variety of areas. A list of the SREB manpower publications is included in the Bibliography.

Nineteen states reported that they had not engaged in manpower studies, though a number expressed the hope that they would do so in the foreseeable future. Seven (Delaware, Pennsylvania, Illinois, California, Alabama, Oregon, and Florida)

had completed general studies of college-level manpower supply and demand.

Thirteen agencies reported having completed manpower studies in some area of health manpower (Pennsylvania, Connecticut, New York, Virginia, Illinois, Texas, Minnesota, Tennessee, New Jersey, Ohio, Maryland, Rhode Island, and Indiana). These ranged from studies of a specific profession, such as nursing or dentistry, to studies covering the entire field of health professions. Some states, such as Virginia, New Jersey, and Connecticut, were producing a series of manpower studies related to the health professions.

Four state agencies (North Carolina, Texas, Florida, and Pennsylvania) have produced manpower studies concerning lawyers, while Tennessee and Pennsylvania reported studies dealing with education manpower and Florida had conducted a study dealing with the need for architects in that state.

This section of the review of related literature is not intended to be an in-depth analysis of college-level manpower studies conducted in other states. Rather, it represents an overview of the studies which have been sent to us by other statewide governing and coordinating postsecondary education agencies. Brief descriptions of the methods and findings of the general studies conducted in other states are included because they illustrate the types of studies currently pursued at the state level closely related to our own future efforts. We have also commented upon a number of health manpower studies because this field is receiving considerable attention in many states.

A list of the college-level manpower-related materials we have received from other statewide governing and coordinating agencies for postsecondary education is contained in the Bibliography.

GENERAL STUDIES

There are a variety of ways in which college-level manpower studies of a general nature can be conducted. In some cases only the supply aspect is studied, as in surveys of high school seniors which investigate their vocational and educational plans. In some cases both supply and demand projections have been developed in order to anticipate future manpower shortages and surpluses. A major problem faced by any general manpower supply and demand study is the ill-defined relationships between graduates of many programs and the occupations they pursue.

Delaware: A 1973 questionnaire survey of high school seniors in the State of Delaware yielded the information that 57 percent of the respondents planned to continue their formal education immediately upon graduation and an additional 23 percent planned to engage in more formal education at some time in the future. Eighty-three percent of those intending immediate continuation aspired to positions of a professional or technical nature. The college programs most frequently chosen by the seniors were nursing (6.9 percent), business administration (6.2 percent), secretarial studies (4.9 percent), and elementary education (4.6 percent). Only 17.2 percent of those planning to attend college expected to

major in the arts and sciences. Approximately two-thirds of those intending to continue their education expected their next academic certificate to be a bachelor's degree.

Oregon: A 1972 survey of a sample of high school seniors in the State of Oregon found that 48 percent of the respondents desired to engage in full-time formal education the following year and an additional 21 percent wished to do so on a part-time basis. Approximately half of the seniors preferred to enter academic programs with the remaining half choosing programs of a vocational or technical nature. The learning of job or career skills was the primary reason for engaging in post-secondary education for 83 percent of the respondents.

Another Oregon study investigated the experiences of 1971 graduates of postsecondary education programs. Seventy percent of the respondents were working, 19 percent were engaged in further schooling, and four percent reported that they were unemployed. Two-thirds of the respondents stated that their primary reason for having engaged in postsecondary education was "to learn skills necessary for a job or career." Of those who responded in this manner, 6.6 percent indicated that their subsequent jobs were directly related to their training.

An attempt was made in Oregon to conduct a manpower supply/demand study. The methodology included a general comparison of supply and demand trends for graduates of various types of programs. The study found unmet demand in academic areas to exist only for health and computer science fields. Greater numbers of fields of study in apprenticeship, proprietary, and

community college programs showed demand exceeding supply than in bachelor's programs.

Alabama: A college level manpower study was conducted in 1972 in the State of Alabama. This study used a general report of degrees conferred in Alabama from 1960-1970 as a basis for projecting supply. Demand was determined by relating national projections to the particular situation in Alabama. These supply/demand estimates were then used to report upon employment prospects in selected fields for the subsequent decade. The data suggested that the only field in which demand would considerably exceed supply was in the health professions.

Pennsylvania: The Pennsylvania State University Center for the Study of Higher Education conducted a study of baccalaureate degree recipients in the state in the 1971-72 academic year in order to determine the employment conditions of those graduates within the first few months after graduation. Their primary sources of data were the placement offices at the state's institutions.

The study found that approximately 20 percent of the graduates (as many as 30 percent in some fields) were still seeking employment. Fifteen percent had entered full-time graduate study.

Nearly 65 percent of those graduating from professional programs had found employment, and 59 percent had jobs related to their educations. Only 6 percent had entered graduate school. Twenty-two percent were still seeking employment.

Of the graduates of nonprofessional programs, only 40 percent were employed (11.5 percent in jobs related to their educations) and 31 percent had entered full-time graduate study. Twenty-one percent of this group were still seeking employment.

The Pennsylvania study also found that only 3.6 percent of the graduates had neither sought employment nor entered graduate school. This implies that women (who accounted for more than 40 percent of the study's population) were choosing to enter the labor force or graduate school in greater numbers than had been anticipated.

California: A 1972 report sponsored by the Coordinating Council for Higher Education of the State of California investigated manpower supply and demand in selected occupations. Though the researchers noted numerous problems inherent in a supply/demand type of manpower study, their investigation was basically of that nature. They collected statistical data concerning contemporary supply of degrees and job market demand, determined trends, projected into the future, and compared supply estimates with job demand estimates. Among those problems noted by the researchers, the most critical to any manpower study are the weaknesses of using the past to project into the future, and the absence of a linear relationship between degrees and jobs. They also noted a lack of adequate enrollment data, changing job-entry standards, and a paucity of information concerning students' objectives, motivations, and values as important problem areas.

Illinois: A 1972 study conducted at the Champaign-Urbana campus of the University of Illinois attempted to relate statewide manpower requirements to the degree production of that institution. Two different supply and demand models were developed and an attempt was made to build different feasible national economic situations into the study. The conclusions of the University of Illinois study indicated that the overproduction of college-degree graduates could be evident by 1975, and that market forces appeared to be working in moving students from low-demand fields.

Florida: A manpower supply and demand study conducted for the Florida Board of Regents related contemporary studies and reports to the situation in Florida. Demand projections were drawn primarily from a Florida State Department of Commerce publication and supply projections were taken from legislative budget requests and institutional six-year plans. Data of the Bureau of Labor Statistics were also relied upon heavily for general estimates of national supply and demand situations.

One section of this report dealt with the anticipated crisis related to the overproduction of Ph.D.'s. It was recommended that Florida's moratorium on new Ph.D. programs be continued as a minimal step toward alleviating this imbalance.

HEALTH PROFESSION STUDIES

Recent years have seen a great deal of attention focused upon manpower needs in health-related fields. An obvious need for planning and coordination in this area has combined with an availability of research funds for health manpower studies and resulted in a number of significant publications either conducted or sponsored by statewide postsecondary education governing or coordinating agencies.

Tennessee: A study was conducted in Tennessee in 1970-71 with the purpose of producing a plan for the provision of allied health personnel within that state. Supply and need data were collected for nineteen professions and analyzed on state, region of state, and type of locale bases. In general, need was determined by means of comparing local personnel/population ratios with national figures. Surveys of vacant positions and additional desired positions as well as estimates of ideal staffing patterns were also used in assessing needs. Upon the determination of supply and need in each profession, recommendations were made for the best manner in which the needs of the state could be met. Among the major problems encountered in the course of the study the authors listed:

1. Defining the allied health field.
2. Emerging occupations.
3. Uncertainty about the future health delivery system.
4. Inconsistent availability of information on supply.
5. Inconsistent availability of need information.
6. Different approaches to education for allied health professionals.

Connecticut: A study in Connecticut, sponsored by the Connecticut Commission for Higher Education, undertook the determination of supply and demand projections for selected health professions and made recommendations based upon these findings. Educational questionnaires and employer questionnaires were developed and distributed to more than 1,500 institutions and facilities. An additional sample of more than 100 educators and employers was also personally interviewed. These surveys provided the major data for the report and its recommendations.

In general, the Connecticut findings indicated that there was a fairly close relationship between supply and demand for health manpower in the state. A number of fields were found to be experiencing current or anticipated manpower shortages. However, some fields appeared to have reached the point at which supply surpassed demand. Among these were nurse midwife, cytotechnologist, radiologic technician, occupational therapy assistant, recreation therapist, and respiratory therapist. The fact that supply was already exceeding demand in these fields stands as a warning of the dangers involved with indiscriminate expansion of programs without concern for actual manpower requirements. Connecticut appeared to have discovered this potential problem in time to avoid overproduction of some types of allied health personnel.

New Jersey: The Department of Higher Education of the State of New Jersey is currently undertaking a long-term health manpower study. To date, two of a projected three monographs have been completed.

The initial New Jersey monograph deals with the distinctions between the concepts of need and demand. Using an economics-oriented method of analysis, the authors concluded that manpower planning based upon need will lead to misallocation of resources and unemployment resulting from overproduction. People, they contended, will not choose to consume all the health care they need, but at some point will use their money for other consumer products. They therefore decided to base their study upon demand rather than need.

The second monograph described the methods by which the New Jersey Department developed a uniform data base for licensed health professionals and noted that moves had been initiated to develop a similar data base for the non-licensed as well. The monograph included data on osteopaths, podiatrists, and chiropractors as illustrations of the project's activities.

Virginia: In 1973, the State Council of Higher Education for Virginia was mandated by the state's General Assembly to conduct a Health Manpower Study. The study was to include a statewide health manpower educational plan, and to develop a health manpower planning information system.

Four technical reports have been published to date by the Health Manpower Study. These deal with the state's optometry manpower, pharmacy manpower, dental manpower, and its health

manpower education programs. The studies of health manpower fields include projections of supply and demand, and recommendations are made in which the health manpower needs of the state concerning each field can best be met.

Additional Virginia studies have been initiated in the areas of health facilities, continuing education in the health sciences, allied health manpower, nursing manpower, and physician and surgeon manpower.

PART V.

INDIANA MANPOWER STUDIES

INDIANA EMPLOYMENT SECURITY DIVISION

Within the State of Indiana, three state agencies have conducted manpower-related studies on a regular basis: the Indiana Employment Security Division, the Indiana State Board of Health, and the Department of Public Instruction. Of the three, the Employment Security Division has been the most active.

The Indiana Employment Security Division (IESD) is a federally funded state agency operating two basic programs: unemployment insurance and the Indiana State Employment Service. The Research and Statistics Section within the Division was developed as an aid to the administration of these programs. Among the primary activities of the Research and Statistics Section has been the conducting of studies related to area and statewide manpower demands and projections of future demands.

During the 1950's and early 1960's the IESD conducted a number of short-term supply and demand studies for selected occupations. These studies utilized an employer survey method which was expensive, slow, and highly dependent upon the expertise of the respondents.

One of the first Indiana studies to be completed without the use of an employer survey method was the research reported in Manpower Trends to 1970. It involved the use of 1950 and 1960 census data, data on labor force and occupational

changes in the state and nation along with projections of national and state industry trends. The study was superceded by Indiana Manpower Projections 1967-1975 and Indiana Regional Employment Projections 1967-1975, also completed without the use of a survey of employers.

In August, 1974, the Research and Statistics Section of the IESD published a document titled Indiana's Interim Manpower Projections, 1970-1980. Included in this document was a report on 1970 employment and projected 1980 employment by occupational categories and by specific occupations. Also included were projections of job openings due to growth and to labor force separations for the ten year period, 1970-1980. A matrix method, developed by the U.S. Bureau of Labor Statistics, was used in making the projections.

Table 9 represents the projections of occupational demand to 1980, reported by occupational categories.

Currently the Research and Statistics Section is compiling and publishing a series of surveys on statewide occupational employment for each of the Standard Industrial Classification code occupations. The surveys, published as the Occupational Employment Statistics Program, indicate the employment level and trend, from 1960, for each of the industry classifications. A growth rate for the industry surveyed is obtained and then contrasted with the all-manufacturing industries growth rate and a growth rate for related industries. To date, sixteen monographs have been published, all in the manufacturing of durable goods category.

TABLE 9: INDIANA'S OCCUPATIONAL DEMAND, 1970-1980

	1970 Employment	1980 Employment Projection	Job Openings Resulting From: Industry expansion and occupational structure changes 1970-1980 Number Change 1970-80	Per Cent Change 1970-80	Labor Force separations Number	As Per Cent of 1970 Employment	Total job openings to be filled between 1970 and 1980 Number	As Per Cent of 1970 Employment
Total, All Occupations	1,850,593	2,067,448	216,855	12	722,320	39	939,175	51
Professional, Tech. and Kindred	239,505	285,334	45,829	19	96,140	40	141,969	59
Mgrs., Officials and Proprietors	139,771	173,781	34,010	24	47,840	34	81,850	59
Sales Workers	122,761	143,614	20,853	17	56,010	46	76,863	63
Clerical Workers	295,975	350,745	54,770	18	178,340	60	233,110	79
Craftsmen, Foreron and Kindred	301,087	328,325	27,238	9	63,720	21	90,958	30
Operatives, Except Transport	313,976	325,305	11,329	4	92,850	30	140,179	33
Transport Equipment Operatives	77,326	82,436	5,110	7	14,250	18	19,360	25
Service Workers	228,864	246,532	17,668	8	130,560	57	148,228	65
Laborers, Except Farm	73,159	76,296	3,137	4	15,550	21	18,687	26
Farmers and Farm Workers	58,169	55,081	- 3,088	- 5	27,060	47	23,972	41

Source: Indiana's Interim Manpower Projections 1970-1980.

STATE BOARD OF HEALTH

The Division of Public Health Statistics of the State Board of Health has been primarily responsible for compilation of the state's vital statistics: birth, mortality, marriage index, etc. Its periodicals include the monthly Bulletin, Indiana Vital Statistics, Indiana Marriage Index, Health Inventory, and Statistical Summary on various topics. Of particular interest to manpower planners has been a series of Indiana population projections by age categories published in issues of the Bulletin.

DEPARTMENT OF PUBLIC INSTRUCTION

The Department of Public Instruction has compiled selected educational statistics, predominantly concerned with elementary and secondary schools and school corporations. Enrollment data, number of high school graduates, professional staff, and pupil-teacher ratios produced by this department have been of particular interest to manpower planners. In addition, the department has sponsored research on enrollment projections by grade level for kindergarten through grade twelve and occasional teacher supply and demand studies.

INDIANA DENTAL ASSOCIATION

The Dental Health Manpower Study was conducted by a manpower committee composed of members of the Indiana Dental Association and the Indiana University School of Dentistry. Their report claimed that because of Indiana's strong support of preventive dental measures, particularly the fluoridation of drink-

ing water for a majority of the state's inhabitants, the dentist manpower-to-population ratio need only be maintained at its current level. They did find, however, that a distribution problem existed in the state and that many non-urban areas were without adequate dental care. They recommended measures whereby dental school graduates could be attracted to such parts of the state.

INDIANA STATE ADVISORY COUNCIL FOR VOCATIONAL EDUCATION

The Indiana State Advisory Council for Vocational Education, in 1973, sponsored a manpower supply/demand study covering a broad range of occupations. Manpower demand was determined by means of Indiana Employment Security Division projections. Supply was estimated by means of surveying secondary and postsecondary education institutions. The data were analyzed by region of state and varying demand levels were reported for each occupation in each region. The Council has recently contracted with a private research firm for an update of the study's data with a somewhat modified methodology.

INDIANA HEALTH CAREERS, INC.

Indiana Health Careers, Incorporated, is primarily a nonprofit vocational guidance service promoting medical and paramedical careers plus health related technical and service occupations. It is supported by the contributions of member organizations which include Indiana's medical and paramedical health agencies, educational institutions, a foundation, and industry. The agency serves as a clearing-house for information about all

medical and paramedical professions and their supporting technical and service personnel. The two most recent publications of the agency are Health Manpower Study and Health Occupations and Professions. The former is the summary of a study of current Indiana health manpower in 28 occupational categories, and the latter is an inventory of health occupation education and training programs within the state.

INDIANA COMMISSION FOR HIGHER EDUCATION (I.C.H.E.)

In 1973, two reports were completed for the Manpower Subcommittee of the Advisory Committee on Health Careers Education, an advisory group to the Indiana Commission for Higher Education.

The Manpower Situation in Nursing was prepared by E. Holmquist of the Indiana State Nurses' Association. Referring to the report of the 1963 Surgeon General's Consultant Group on Nursing, Holmquist stressed the need for increased training of nurses at graduate levels to fill needs for teaching and leadership positions. The three Indiana Schools of Nursing offering graduate programs were encouraged to develop graduate programs in public or community health nursing to meet needs of school, public, and occupational health nurses.

Holmquist also recommended that the rationale for the development of new nursing programs be based upon current Indiana manpower studies rather than upon extrapolations of national statistics. In this way, Indiana's educational resources can best be taken into account.

A major difficulty encountered by Holmquist was an inability to determine precisely how many nurses were actually employed

in Indiana. This resulted from the fact that many Indiana registered or licensed nurses were either not working, or were working outside the state. Still, by all reasonable measures, she found that there was a serious shortage of nurses providing health care and anticipated that these shortages would continue into the foreseeable future.

The report, A Study of Nursing Needs in Indiana, was conducted for the Advisory Committee on Health Careers Education by a Task Force of the Council on Education (Indiana State Nurses' Association). The Task Force found that the greatest shortages of nursing manpower existed at the master's and doctoral levels. They called for sharp increases in the number of graduate programs in nursing education and recommended that the concepts of open curriculum and career mobility be supported by all schools of nursing. It was also recommended that nursing manpower needs and resources be considered in the establishment of new programs in nursing education at all levels.

PART VI.

INDIANA COLLEGES' AND UNIVERSITIES' MANPOWER STUDIES

During the summer of 1974, the staff of the Indiana Commission for Higher Education (I.C.H.E.) conducted a statewide query attempting to establish an inventory of recent college-educated manpower studies completed, in progress, or planned by members of the higher education community in Indiana. The instrument was composed of five open-ended questions. The first four questions requested that the respondent identify appropriate manpower-related studies in each of the following categories: 1) supply of college educated graduates; 2) the demand for such graduates; 3) occupational manpower requirements; and 4) college-age demography. The fifth question requested the respondent to identify, if one existed, a component, department, or unit within the institution which was responsible for conducting ongoing or periodic college educated manpower research.

Of the 35 queries sent to Indiana's private postsecondary institutions, 32 or 91.4 percent of them were returned. Of those returned, six stated that they were involved in the area of manpower related research. Of the six, two were not specific in identifying their activities.

The University of Notre Dame appeared to be the most active of the private colleges and universities in terms of manpower studies. The Analytical Studies Office has been conducting a survey of Notre Dame graduating students each year since the early 1970's in an effort to identify the future plans of their

departing students.

The Notre Dame Placement Office conducts studies on an irregular basis related to the demand for college graduates and occupational manpower requirements. The University utilizes demographic studies conducted by the United States Office of Education and by state agencies, but also conducts similar studies within the University.

In the public sector, Ball State University, Indiana State University, Indiana University-Bloomington, Purdue University-West Lafayette, Indiana Vocational Technical College, Vincennes University and Indiana University-Purdue University at Indianapolis (IUPUI) reported involvement in some sort of original manpower-related study on at least one of the first four questions, although most of the information used was generated by other sources. The major exceptions are the Office of Manpower Studies at Purdue University; the Division of Research and Business Horizons, the Office of Budgeting Analysis and Planning, and the Office of Institutional Research at Indiana University; and the Research Division of Indiana Vocational Technical College.

PURDUE UNIVERSITY

In April, 1964, the Purdue University Board of Trustees authorized the development of a School of Technology. One of the functions of the new school was to pursue research and manpower studies that would provide information and data on the growing and changing needs and demands for technological education and programs. As a result, the Office of Manpower Studies

was created and charged with two basic duties:

1) to establish and operate a continuing survey of manpower requirements and trends in in Indiana in order that educational and training agencies can better prepare people for employment opportunities; and

2) to encourage research activity in the University aimed at solving problems and developing understanding of a more fundamental nature in the manpower training field.[8]

The first report of the Office of Manpower Studies was published in January, 1965. Since that time, more than 35 additional reports have been published. Almost two-thirds of the reports deal with a specific occupation or group of occupations and more than two-fifths of the reports focus on specific geographic regions, counties, or cities of the state. Twenty percent of the reports deal with both specific occupations and geographic regions while approximately fifteen percent have reported upon the educational and vocational plans of high school students and changing trends in those plans. Approximately one-half of the studies present some form of short-term supply and demand or needs projections. A complete list of this Office's publications to date is contained in the Bibliography.

INDIANA UNIVERSITY

Since its founding in 1925, the Division of Research within the School of Business at Indiana University has been involved with research projects centered around the business

[8]Lisack, J.P., Technical-Level Educational Planning for the Chemical Technology in Indiana, p. 58.

and economic environment of the State of Indiana. Studies of interest to manpower planners include Manpower Forecasting in Indiana Construction Industry, 1974; Projections of Employment: Population and Income by Economic Region of Indiana, 1971; and Population Projections by Age and Sex on a County Basis to 1990, Indiana (not yet completed). In addition, the Division has recently developed the Indiana Information Retrieval System (INDIRS) with the support of the Indiana Educational Services Foundation and the Indiana State Department of Commerce. This system encompasses the acquisition, storage, retrieval, and organization of socioeconomic data covering the state, each of its 92 counties, the 11 Standard Metropolitan Statistical Areas, the 14 state economic regions, and over 217 Indiana communities.

Also at Indiana University, the Office of Budgetary Analysis and Planning, in cooperation with the Department of Public Instruction, is continuing annually to update studies of projections of Indiana high school enrollment and graduates.

The Health Divisions of IUPUI (Medicine, Nursing and Dentistry Schools) have produced or been involved in a number of manpower-related studies. These studies include the Medical Report of the Task Force in Manpower, A Study of Nursing Needs in Indiana, The Manpower Situation in Nursing in Indiana, and Health Manpower Study.

INDIANA VOCATIONAL TECHNICAL COLLEGE (IVTC)

IVTC has participated in a number of surveys related to demands for its graduates and to college-age demography. In the former category are seven surveys of manpower needs for

various regions within the state. Most of the surveys cover the general field of manpower needs while two of the studies surveyed the needs for specific occupations within the region.

ITVC has worked with Purdue's Office of Manpower Studies in the surveying of educational/occupational plans of seniors in the Indiana high school classes of 1966, 1969, and 1972. In each study the characteristics and post-graduation plans of high school seniors were ascertained. A 1975 survey is also anticipated.

In December of 1972, the Research Division of IVTC conducted a follow-up study of a nonrandom sample of nearly 30,000 seniors queried in the 1971-72 survey of Indiana high school seniors. Approximately 7,500 (25 percent) follow-up questionnaires were returned and matched with the respondents' senior survey forms. More than sixty percent of the respondents were implementing the plans they had reported as seniors. Eighty percent of those who had stated they planned to continue their education full-time after graduation were doing so. Approximately half still adhered to the same occupational choice they made as seniors and a large proportion of those that had changed their occupational choice, changed to a related occupation.

During 1973, IVTC studied the job orientations of graduates of IVTC's health occupations programs. A questionnaire was mailed to the 1288 graduates of health occupations programs since 1968. A total of 443 graduates responded. Approximately 72 percent of the respondents were employed full time and another 17 percent were employed part time. Most of those

employed were working in hospitals (60 percent) while another 16.5 percent were working in doctors' offices. Of those unemployed, almost half (48 percent) were unemployed by their own choice. In most cases the respondents appeared to have had little difficulty obtaining and holding jobs related to their fields of study.

PART VII.
CONCLUSIONS

Among the general conclusions to be drawn from this review of literature related to college-level manpower studies are the following:

1. There is a great deal of information related to college-level manpower supply and demand at the national level. This information encompasses all occupations and levels of education.

2. National manpower data are not necessarily applicable at the state level. For example, national statistics concerning increasing needs for oceanographers would be more closely related to California than to Wyoming.

3. The statewide coordinating agencies for postsecondary education in many states have conducted manpower studies. The fields most frequently studied at the state level have been those related to health career manpower.

4. There is a dearth of college-level manpower studies related specifically to the State of Indiana.

Our review of literature has led us to conclude that such studies can be a valuable aid in postsecondary education planning. Manpower studies provide insight into the employment market's demand for the graduates of degree programs and, to the extent that occupations are related to postsecondary education, this input into the program planning process is necessary.

Unfortunately, the relationships between postsecondary educational programs and the demands of the labor market are difficult to define and assess. A college-level manpower study

should take into account factors which influence these relationships. Among such intervening variables are included:

1. The absence of a linear relationship between most jobs and college education.
   Linear relationships do exist in some fields. For example, we know the graduate education program required for one to become a physician or lawyer. However, what undergraduate program should one follow to enter medicine or law, and what should one study to become an insurance salesman?

2. Employers' Desires
   There is ongoing debate as to who should be hired for many occupations. The lack of linear relationships between education and many jobs leaves a great deal of decision-making in the hands of employers regarding which levels and types of education best relate to various types of employment.

3. Credentialism
   As we produce more college graduates, to what extent do the formal and informal requirements for educational levels of employees rise?

4. Underemployment
   Do the graduates of many programs find themselves in jobs which do not utilize their talents? If so, is this a temporary or long-term situation for the individual? To what extent should underemployment be a concern of higher education?

5. Student Desires
   Why does a student major in the field he chooses? In many cases he chooses a field of interest, postponing in-depth concern for a career. Even in some fairly technical programs we are not certain that the student intends to pursue his life-work in a career related to the program of study. To what extent do such factors as a student's values, interests, goals, motivation, peers and family affect his educational and vocational plans?

6. Demand versus Need
   To what degree should planners concern themselves with what might be "best" for society (needs), or should they be exclusively concerned with educating for demand (actual job openings)?

These variables, and numerous others, can create havoc for planners who do not take them into account. However, they do not exist in isolation but in continuous inter-relationships with one another and with the state of the economy, the government, and the nature of society itself.

Manpower planning does not attempt to identify a static state toward which higher education should be guided. There can be no such state, because the future remains constantly before us and the nature of planning must be a dynamic ongoing process. Manpower study enables us to identify general directions in which we should be travelling so that adjustments are not radical shifts in reaction to crises, but remain mild modifications toward a hoped-for balance of manpower supply and demand.

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